

**U.S. Patent Application No. 10/088,134  
SUBSTITUTE SPECIFICATION  
(Marked-Up Version)**

**DEVICE FOR EXHAUSTING IN VACUUM CLEANER EXHAUST SYSTEM**

[0001] This application is the national phase under 35 U.S.C. §371 of PCT International Application No. PCT/KR00/00215, which has an International filing date of March 15, 2000, which designated the United States of America.

Technical Field

[0002] The present invention ~~related~~ relates to a vacuum cleaner, and more particularly, to a device for exhausting in a vacuum cleaner for exhausting air which flows from inside a vacuum cleaner to outside the exterior thereof.

Background Art

[0003] Generally, a vacuum cleaner generates a suction force ~~when cleaning a house, a car etc., to remove foreign matters such as dusts by the suction force~~ for picking up dirt and debris, such as dusts and other particulate matter. The suction force is created by a flow of air between an intake port and exhaust port and that travels through the interior of the vacuum cleaner.

[0004] Referring to Figs. 1 and 2, the vacuum cleaner ~~includes a main body 10 having a dust collecting bag 11 therein, and a suction nozzle 20 connected to the main body 10 for suction of interior air and various foreign matters. A suction hose 31, a grip portion 32, and an extension pipe 33 are sequentially connected between the suction nozzle 20 and the main body 10, for guiding the foreign matters drawn through the suction nozzle 20 to the dust collecting bag 11. Additionally, a fan 13 which is rotated by a driving force of a motor is mounted inside the main body 10.~~ 1 creates a suction force by generating a continuous air flow through various constituent parts of the vacuum. The vacuum cleaner 1 uses an electric motor to create an air flow that is directed toward an exhaust port resulting in a pressure drop on the intake side of the motor. This pressure drop creates a suction force, or an air flow, at the intake port that is used to pick up dirt and debris. Dirt

and debris suspended in the air flow are carried into the vacuum and pass through a filter or filters as the air flow is exhausted into the atmosphere.

[0005] The vacuum cleaner 1 includes a main body 10. A fan 13, rotated by a driving force of a motor, is mounted inside the main body 10 for creating the air flow described above. The intake side of the vacuum includes a suction nozzle 20 connected to the main body 10 by a suction hose 31, a grip portion 32, and an extension pipe 33. These elements are sequentially connected between the suction nozzle 20 and the main body 10 for guiding the air flow with foreign matters drawn through the suction nozzle 20 into the main body 10.

[0006] The air which is drawn to inside of the main body 10 of the vacuum cleaner 1 passes through the dust collecting bag 11 that filters the dirt and debris from the air as it migrates through the vacuum. Once filtered, air is then ~~and is~~ exhausted through a plurality of exhaust holes 14 formed at rear of the main body 10. ~~At this instance, an~~ An air exhaust filter 15 is mounted at an inner part of the main body 10 ~~at which~~ across the plurality of exhaust holes 14 ~~are formed~~, to collect fine dusts contained in the air exhausted through each of the plurality of exhaust hole 14.

[0007] To promote ease of movement, the main body 10 has a plurality of wheels ~~Wheels~~ 16 that are rotatably mounted ~~at on~~ both sides of the main body 10, ~~for moving the vacuum cleaner to places to be cleaned.~~ The mounting structure of each of the wheels 16 is shown in Figs. 3 and 4. Each of the wheels 16 is connected to the main body 10 using a combination of supporting elements. As shown in the drawings, each of the plurality of wheels include a hook 16a, ~~is formed at innermost~~ near the center rotational axis of the wheel 16, and a projected locking portion 10a, for mounting the hook 16a thereto, that is formed at the outer surface ~~of both sides~~ of the main body 10. ~~Accordingly, the wheels 16 are connected to the main body 10.~~

[0008] However in conventional vacuum cleaners, the aforementioned wheels 16 are merely ~~for moving~~ used for the sole purpose of facilitating the easy movement of the main body 10 ~~of the vacuum cleaner~~, and do not have any other functions.

[0009] Additionally, the air exhaust filter 15 ~~should~~ must be frequently replaced ~~because it has to be maintained clean all the time.~~ with a clean filter to ensure that dirt and debris trapped in the filter does not impede air flow created by the vacuum. Accordingly, In a

conventional vacuum, it was quite cumbersome for a user to replace the air exhaust filter ~~often and which requires the user, in some systems,~~ to disassemble the entire vacuum cleaner for replacing of the air exhaust filter.

**[0010]** ~~Additionally, Further, while~~ the functions and designs of a vacuum cleaner ~~are being~~ have been recently improved, ~~improved recently~~ the aesthetic appearance has not. Moreover, In particular, the plurality of exhaust holes 14 formed at rear of the main body 10 ~~is~~ are visually ~~unpleasant unappealing~~ because of ~~the preconception user perception~~ that the air inside the vacuum cleaner is exhausted thereto, ~~and variations to other shapes are limited.~~

#### Disclosure of Invention Summary of The Invention

**[0011]** Accordingly, the present invention is directed to ~~a device for exhausting an exhaust system~~ in a vacuum cleaner that substantially obviates one or more of the problems due to limitations and disadvantages of the relate art.

**[0012]** An object of the present invention is to provide a device for exhausting in air from a vacuum cleaner, ~~whose~~ in which an air exhaust filter can be easily replaced.

**[0013]** Another object of the present invention is to provide a device for exhausting in air from a vacuum cleaner, ~~which reduces visual discomfort of a user by hiding with a visually appealing aesthetic appearance that masks~~ the exhaust holes by incorporating them into other structural features of the vacuum.

**[0014]** Additional features and advantages of the invention will be set forth in the description which follows, and in part will be apparent from the description, or may be learned by practice of the invention. The objectives and other advantages of the invention will be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

**[0015]** To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described, the device for exhausting in air from a vacuum cleaner includes a main body for suction and collecting of various contaminants, wheels rotatably mounted at both sides of the main body, an exhaust flow passage formed between the main body and the wheels, for discharging the filtered air ~~cleaned inside from~~ the main body, and an air exhaust filter provided at the exhaust flow

passage port for filtering the fine dusts contained in the exhausted air once again dirt and debris.

#### Brief Description of the Drawings

**[0016]** The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and together with the description ~~service~~ serve to explain the principles of the invention:

**[0017]** In the drawings:

**[0018]** Fig. 1 is a perspective view ~~showing the related art~~ of a conventional vacuum cleaner, ~~schematically~~;

**[0019]** Fig. 2 is a cross-sectional view showing ~~an inside of a main body of the related art~~ the interior of a conventional vacuum cleaner;

**[0020]** Fig. 3 is a disassembled perspective view showing ~~an assembling relationship between the related art main body of a vacuum cleaner and a wheel~~ structure for mounting a wheel to the main body of a conventional vacuum cleaner;

**[0021]** Fig. 4 is a cross-sectional view showing ~~a main part of the wheel in a wheel and the structure for mounting a wheel to a conventional vacuum cleaner of Fig. 3 connected to the~~ a main body of the a vacuum-cleaner;

**[0022]** Fig. 5 is a disassembled perspective view showing a an exhaust device for ~~exhausting in~~ a vacuum cleaner in accordance with a first embodiment of the present invention;

**[0023]** Fig. 6 is a cross-sectional view ~~showing a main part of the wheels connected to the main body of a vacuum cleaner, having the device for exhausting of Fig. 5~~ of the exhaust device of Fig. 5 with a wheel mounted to the main body of a vacuum in accordance with a first embodiment of the present invention;

**[0024]** Fig. 7 is a disassembled perspective view showing a an exhaust device for ~~exhausting in~~ a vacuum cleaner in accordance with a second embodiment of the present invention;

**[0025]** Fig. 8 is a cross-sectional view ~~showing a main part of the wheels connected to the main body of a vacuum cleaner, having the device for exhausting of Fig. 7~~ of the

exhaust device of Fig. 7 with a wheel mounted to the main body of a vacuum in accordance with a second embodiment of the present invention;

**[0026]** Fig. 9 is a disassembled perspective view showing a main part of a variation of a grip portion in accordance with the second embodiment of the present invention;

**[0027]** Fig. 10 is a disassembled perspective view showing ~~a device for exhausting in an exhaust device for~~ a vacuum cleaner in accordance with a third embodiment of the present invention;

**[0028]** Fig. 11 is a cross-sectional view showing each component of Fig. 10 in an assembled state in accordance with a third embodiment of the present invention;

**[0029]** Fig. 12 is a disassembled perspective view showing a main part of a variation of a grip portion in accordance with the third embodiment of the present invention;

**[0030]** Fig. 13 is a disassembled perspective view showing ~~a device for exhausting in an exhaust device for~~ a vacuum cleaner in accordance with a fourth embodiment of the present invention; and

**[0031]** Fig. 14 is a cross-sectional view showing each component of Fig. 13 in an assembled state in accordance with a fourth embodiment of the present invention.

~~<description on symbols for key parts of the drawings>~~

100: main body ————— 101: exhaust hole  
102: guiding projection ——— 103: center axis  
160: wheel ————— 161: air exhaust filter  
162: guiding member ————— 163: rolling member  
164: grip portion

#### ~~Best Mode for Carrying Out the Invention~~ Detailed Description of the Preferred Embodiments

**[0032]** Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

**[0033]** Fig. 5 is a disassembled perspective view showing a an exhaust device for exhausting in a vacuum cleaner in accordance with a first embodiment of the present invention that includes an exhaust device that combines a wheel with an exhaust filter.  
~~The first embodiment of the present invention suggests a device for exhausting, having an~~

~~exhaust flow passage formed between a main body 100 of the vacuum cleaner and wheels, and an air exhaust filter 161 integrally formed at the exhaust flow passage. The exhaust flow passage is formed by opening a portion at which wheels 160 of the main body 100, and the wheel 160. Additionally, a guiding projection 102 is formed at an outer surface of the main body 100 at which the exhaust hole 101 is formed, for connecting the wheel 160.~~

[0034] While only one wheel 160 is shown and described with respect to the first preferred embodiment, a second conventional wheel is disposed on the opposing side of the main body 100.

~~The wheel 160 includes a guiding member 162 for receiving an air exhaust filter 161, and a rolling member 163 mounted around the guiding member 162 for performing a rolling movement when contacting a ground. The guiding member 162 is opened, and a rib 162a for preventing detachment and shaking of the air exhaust filter 161 is formed at this opened portion.~~

~~The rolling member 163 has a plurality of projections 163a along an inner circumference thereof, thereby efficiently sliding around the guiding member. The rolling member 163 is generally made of soft materials for smooth contact and rolling on the ground, or it may be formed of other materials.~~

~~— Additionally, at least one locking groove or locking hole 102a are formed around the guiding projection 102, and a locking means such as a protrusion 162b or a hook 162c is formed at an outer circumference of the guiding member 162. The protrusion 162b or the hook 162c of the guiding member 162 is locked to each locking hole 102a of the guiding projection 102, so that the wheel 160 and the main body 100 are connected with each other.~~

~~— At this instance, the protrusion 162b or the hook 162c is preferably formed at each corresponding portion along the circumference of the guiding member 162, for maintaining the connection between the main body and the wheel, and at the same time, easily detaching the wheel from the main body when necessary. The exhaust holes which were conventionally formed at rear of the main body 100 of the vacuum cleaner are shut, thereby exhausting the air passed through the dust collecting bag 11 essentially to a side at which the wheel is formed.~~

~~Accordingly, a design at rear of the main body can be suitably modified by a user, and thus, the visual discomfort of a user can be reduced because the portion to which the air is exhausted is not visible.~~

[0035] A guiding projection 102 is formed about an exhaust hole 101 in the outer surface of the main body 100. The guiding projection 102 is circular shaped and surrounds a plurality of exhaust holes 101 formed in the main body 100. While the exhaust holes 101 are shown as being arcuate shaped, other hole configurations may be equally as effective in promoting air flow. The guiding projection includes a supporting rim that projects from the main body 100 for receiving and for supporting elements of the wheel 160.

[0036] The wheel 160 includes a guiding member 162 for housing an air exhaust filter 161 and for supporting rolling movement of a rolling member 163. The guiding member 162 includes a rim that projects from a circular member. The rim of the guiding member 162 has a diameter that permits a portion of the rim to securely fit within the rim of the guiding projection 102 that together support rotating movement of the rolling member 163.

[0037] The guiding member 162 includes a rib 162a that projects from the center of the rim to its inner surface. The rib 162a defines a plurality of openings that promote air flow through the wheel 160 when engaged with the guiding projection 102 and main housing. The rib 162a of the guiding member also assists in securely holding the air exhaust filter 161 to prevent detachment and shaking.

[0038] The air exhaust filter 161 has a circular shape that fits in a holding chamber defined by the combination of the guiding member 162 and guiding projection 102.

[0039] The rolling member 163 has a plurality of projections 163a along an inner circumference thereof that enable it to slide around the supporting structure. The rolling member 163 is preferably made of a soft pliable material, such as rubber, for smooth contact and rolling on a variety of surfaces, such as carpet, hardwood flooring or linoleum. However, the rolling member 163 may also be formed of other comparatively lesser soft materials such as plastic and metal.

[0040] The wheel is held together by a system that also holds the filter between the guiding projection 102 and the guiding member 162. The locking hole 102a formed in

the rim of the guiding projection 102 receives the protrusion 162b, formed in an outer circumference of the rim of guiding member 162. At the same time, the hook 162c of the guiding member 162 engages a corresponding locking hole 102a of the guiding projection 102, so that the wheel 160 and the main body 100 are connected with each other in a locked condition.

[0041] The protrusion 162b and hook 162c are preferably formed along the circumference of the guiding member 162 for maintaining a secure connection between the main body 100 and the wheel 160, and at the same time, for providing a mechanism for easily detaching the wheel 160 from the main body 100 when necessary.

[0042] The disclosed wheel 160 functions as an exhaust port to promote the free flow of air from the dust collecting bag to outside the main body 100 that replaces the exhaust holes formed at the rear of the main body 100 of a conventional vacuum cleaner.

[0043] Fig. 6 is a sectional view showing the main part parts of the wheels a wheel 160 connected to the main body, having a device for exhausting 100 in accordance with a first embodiment of the present invention.

[0044] As shown in Fig. 6, the air exhausting filter 161 is inserted to be fixed between an outer surface of the main body 100, in at which the exhaust holes 101 are formed, and the guiding member 162, and the The guiding member 162 is being connected to the guiding projection 102 formed at the main body 100 to be fixed thereto by cooperative engagement of the protrusion 162b and hook 162c with the guiding projection 102 and locking hole 102a. A The rolling member 163 performing an actual movement of the main body of the vacuum cleaner is rotatably connected to an outer circumference of the guiding member 162 when connected with the guiding projection 102.

[0045] The operation of the first embodiment of the present invention will be explained in detail.

~~First, when a suction force is generated by a rolling of the fan 13, air and dusts sequentially pass through the suction nozzle 20, the extension pipe 33, the grip portion 32 and the suction hose 31, to be drawn into the dust collecting bag 11 provided within the main body 100. Then, the air containing only fine dusts passes the dust collecting bag 11 and flows inside the main body 100, by the continuous suction force. The air flowing inside the main body is then exhausted to outside of the main body 100 through the~~



~~plurality of exhaust holes formed at one side of the main body 100. At this instance, as the wheels having the air exhaust filter 161 is mounted at the outer surface of the main body at which the exhaust holes are formed, the air and the fine dusts are filtered again at the air exhaust filter 161.~~

~~Accordingly, the air is exhausted and the fine dusts contained in the air are collected at the air exhaust filter 161.~~

~~The air exhaust filter should be replaced as the cleaning process is repeated. When replacing the air exhaust filter 161 with a new one, the guiding member 162 connected to the guiding projection 102 of the main body 100 is simply detached with a force to an outer direction, thereby easily replacing the air exhaust filter 161 located between the guiding member and the guiding projection.~~

~~Meanwhile, the present invention is not limited to the aforementioned first embodiment. That is, the present invention may be formed with such a structure that a user can replace the air exhaust filter easily.~~

[0046] First, a motor rotates a fan creating an air flow on the backside of the fan that results in air flow on the intake side of the vacuum, i.e. a suction force. Air and dusts pass through the suction nozzle 20, the extension pipe 33, the grip portion 32 and the suction hose 31, to be drawn into the dust collecting bag 11 provided within the main body 100. Then, once filtered air passes the dust collecting bag 11 and flows inside the main body 100, the air flowing inside the main body is exhausted to outside of the main body 100 through the plurality of exhaust holes formed at one side of the main body 100 through the wheel 160. Accordingly, air is filtered a second time as it passes through exhaust filter 161 housed within the wheel 160.

[0047] When replacing the air exhaust filter 161 with a new one, the guiding member 162 connected to the guiding projection 102 of the main body 100 is simply detached thereby providing easy access to air exhaust filter 161.

[0048] A second preferred embodiment will now be described with reference to Figs. 7 and 8 ~~propose a shape of the~~ that shows an exhaust device in accordance with a second embodiment of the present invention ~~with which~~ having a structure that allows the air exhaust filter ~~can~~ 161 to be easily mounted and replaced. With the exception of the

structure described below, other parts in the structure are the same as those of the first embodiment.

**[0049]** As shown in Fig. 7, a projected center axis 103 is integrally formed at a side of the main body 100 ~~at which the~~ surrounded by a plurality of exhaust holes 101 ~~are formed, to penetrate the air exhaust filter 161 and the guiding member 162 of the wheel 160.~~ The projected center axis is formed to penetrate corresponding apertures in both the air exhaust filter 161 and the guiding member 162 of the wheel 160. ~~At the same time, the~~ The grip portion 164 ~~selectively connected to the center axis 103~~ is mounted at an outer side of the guiding member 162 of the wheel 160; for connecting to the center axis 103 to fix the guiding member 162 to the guiding projection 102. ~~Other parts in the structure are same as those of the first embodiment.~~

**[0050]** In the aforementioned structure, ~~a separate the~~ grip portion 164 ~~is provided instead of mounting the guiding member 162 directly to the guiding projection 102 using the hook 162b, and a projected center axis 103 is also formed separately at the side of the main body 100 to mount the grip portion 164.~~ Accordingly, the air exhaust filter 161 ~~can be easily detached when necessary.~~ replaces the locking mechanism described in the first embodiment. Additionally, ~~the~~ The protrusion 162b and the hook 162c formed at the outer circumference of the guiding member 162, and the locking hole 102a which was formed at the outer circumference of the guiding projection 102 are not necessary in accordance with the second embodiment of the present invention. That is, an end portion of the center axis 103 which is projected outwardly of the guiding member 162 is formed as a cylindrical shape having an empty space therein, and locking portions 103a are integrally formed along an inner circumference facing each other, to be projected inwardly of the center axis.

**[0051]** A connecting axis 164a which is inserted to inside of the center axis 103 is formed at the grip portion 164. The connecting axis 164a is provided with locking protrusions 164b which ~~is locked to~~ engage the locking portion 103a of the center axis 103 when the connecting axis 164a is inserted to the center axis 103 for preventing detachment thereof; ~~thereby mounting the air exhaust filter 161 easily.~~ The combined structure provides a secure and easily accessible mechanism for mounting the air exhaust filter 161 within the wheel 160.

~~[0052] At this instance, each~~ Each locking protrusion 164b of the grip portion 164 has an inclined surface whose width ~~becomes narrow~~ narrows toward a rear of the grip portion 164, ~~thereby inserting the locking protrusion t the rear of the locking portion easily.~~ That is, when the locking protrusion 164b is located within the locking portion 103 and the grip portion 164 is rotated, the locking portion 103a passes the inclined surface of the locking protrusion 164b and is located at an inner portion thereof, thereby guiding the grip portion 164 to be completely inserted inside the center axis 103. ~~At this instance, since~~ Since a gap between the locking protrusion 164b and a packing member 165 is narrower than the thickness of the locking portion 103a, the locking portion 103a is compressed between the locking protrusion and the packing member 165.

~~[0053] Additionally, a~~ A projected rotation preventing portion 103c is additionally formed axially at one end of the locking portion 103a, for limiting the rotation range of the grip portion 164.

~~[0054] The~~ A packing member 165 is ~~formed~~ positioned on the connecting axis 164a, between an inner wall of the guiding member 162 and the locking protrusion 164b of the grip portion 164 for sealing a gap there between. ~~At this instance, the~~ The packing member 165 is preferably formed of a comparatively flexible material, for sealing the gap at its maximum.

~~[0055]~~ The procedure of mounting the air exhaust filter having the aforementioned structure in accordance with the second embodiment of the present invention will be explained in detail.

~~[0056] First, the air exhaust filter 161 penetrates the center axis 103 projected at~~ penetrates the air exhaust filter 161 as it projects from an inner part of the guiding projection 102 at a side of the main body 100, and, the The guiding member 162 is mounted ~~at an outer part of~~ on the center axis 103 and moves against the guiding projection 162 to form a chamber for holding the air exhaust filter 161. Since a hole 161a is formed at the center of the air exhaust filter 161 so that the center axis 103 can penetrate, the The air exhaust filter 161 can be easily mounted ~~as aforementioned since hole 161a id formed at the center of the air exhaust filter 161 for easy alignment with the center axis 103.~~

~~[0057] At this instance, the~~ The connecting axis 164a of the grip portion 164 is inserted ~~to~~ into the center axis 103 which is exposed through the center portion of the guiding member 162, and the grip portion 164 is rotated ~~clockwise (or, counterclockwise) in the drawing~~ to complete the connection. That is, when the grip portion 164 is rotated, the locking portion 103a formed at the center axis 103 passes the inclined surface of the locking protrusion 164b formed around the connecting axis 164a of the grip portion 164, and is gradually moved to an inner part of the locking protrusion 164b to be closer to a inner surface of the guiding member 162.

~~[0058] Accordingly, the~~ The packing member 165 mounted between the locking protrusion 164b and the guiding member 162 is gradually compressed to seal the space there between, ~~thereby giving a fixing force in accordance with~~ and produce a force to secure the connection of the locking protrusion 164b and the guiding member 162. When in this position, the fixing force of the packing member 165 prevents further rotation of the grip portion 164.

~~[0059] Additionally, when the locking protrusion 164a is locked at the rotation prevention portion 103c formed at the inner wall of the center axis 103 by a continuous~~ Continuous rotation of the grip portion 164, ~~the grip portion 164 cannot rotate any longer and is fixed with the fixing force of the packing member 165 causes the locking protrusion 164a to engage the rotation prevention portion 103c formed at the inner wall of the center axis 103 placing the wheel 160 in a locked condition.~~

~~[0060] A variation of the grip portion of the second embodiment is shown in Fig. 9. As shown there, A~~ a projected, substantially  $\Lambda$  shaped grip portion protrusion 164c is formed ~~at a rear side which is exposed externally, so that a user can rotate the grip portion 164 easily grabbing on an exterior surface of the guiding member 162 to assist a user in firmly gripping the grip portion protrusion 164c. At this instance, the~~ The shape of the grip portion protrusion 164c is not limited to have the aforementioned shape, but can be formed ~~with~~ in other shapes to promote a secure grip such as a "+" or an "I" shape. ~~Additionally, as shown in Fig. 9, since the grip portion 164 is integrally formed at the guiding member 162, it is apparent to those skilled in the art that the guiding member can easily be mounted to and detached from the guiding projection 102.~~

[0061] ~~Meanwhile, A third preferred embodiment will now be described with reference to Figs. 10 and 11 that show a connecting relationship between the center axis formed at a side of the main body 100 and the a separate grip portion, in accordance with the third embodiment of the present invention.~~

[0062] The structure of the third embodiment is ~~almost same as~~ similar to that of the second embodiment, except with respect to the connecting relationship between the center axis and the grip portion. That is, a plurality of screw threads 103b are formed ~~at an outer~~ along an inner circumference of an ~~end portion which is projected outwardly of the guiding member, and~~ aperture in the center axis 103 that is designed to receive a projected connecting axis 164a having corresponding screw threads 164d formed along its outer circumference is formed at the grip portion 164, thereby enabling easy mounting of the air exhaust filter 161.

[0063] The procedure of mounting the air exhaust filter 161 in accordance with the third embodiment of the present invention will be explained in detail.

[0064] First, the air exhaust filter 161 is mounted ~~at on~~ on the center axis 103 ~~projected at a side of the main body which is an inner part of the guiding projection 102, and the guiding member 162 is mounted around the outer circumference of the air exhaust filter 161. Since the~~ The hole 161a is formed at the center of the air exhaust filter 161 ~~so that to receive the center axis 103 can penetrate, allowing the air exhaust filter 161 can~~ is be easily mounted as ~~aforementioned~~ as described above.

[0065] ~~At this instance, the~~ The connecting axis 164a of the grip portion 164 is inserted ~~to~~ into the center axis 103 which is exposed through the center portion of the guiding member, and the grip portion 164 is rotated clockwise ~~(or, counterclockwise) of the drawing to complete the connection by causing the corresponding screw threats to pull the constituent elements together in a secured relationship. The grip portion 164 is not detached from the center axis 103 because the connecting axis 164a of the grip portion 164 is connected within the center axis 103 in a screwed type.~~

[0066] ~~Additionally, a~~ A projected, substantially A shaped grip portion protrusion 164c is formed ~~at a rear side which is on an~~ exposed externally, so that a user can rotate surface of the grip portion 164 ~~easily grabbing the grip portion protrusion 164e to promote a more secure grip by the user. At this instance, the~~ The grip portion protrusion 164c is not

limited to have the aforementioned shape, but can be formed ~~with~~ in other shapes such as a "+" or an "I" shape. ~~Additionally, since the grip portion 164 is integrally formed at the guiding member 162 as shown in fig. 12, it is apparent to those skilled in the art that the guiding member 162 can easily be mounted to and detached from the guiding projection 102.~~

[0067] Fig. 12 shows a modified version of the third preferred embodiment where the grip portion 164 is integrally formed as part of the guiding member 162.

~~[0068] Meanwhile, when a user wants to replace the~~ The air exhaust filter 161 ~~or to detach it for cleaning thereof, may be easily removed from the wheel 160 by rotating the grip portion 164 is rotated counterclockwise (or, clockwise) of the drawing, which is opposite to the initial connection direction, to detach the connecting axis 164a of the grip portion from out of engagement with the center axis 103. Then, Once the guiding member 162 is separated from the center axis 103, to detach the air exhaust filter 161 may be removed.~~

~~[0069] However, with~~ With the aforementioned structure, ~~fine dusts passing through each embodiment, the exhaust hole holes 101 are integrally formed as part of the main body 100 contacts a side of the main body 100 and contaminate the portion. However, a situation may occur where the exhaust holes become blocked with debris. For example, fine dusts passing through each of the exhaust holes 101 of the main body 100 may collect in the exhaust holes as a result of moisture that passes through the vacuum or that is introduced from the outside. Accordingly When this occurs, a user has to must wipe or clean the entire side portion of the main body 100 to remove the contaminants thereof. Considering that various circuit substrates are located inside the main body 100 of the vacuum cleaner, water may be flown into the main body 100 because of the cleaning of the side portion of the main body 100, as well as causing inconvenience for a user in that the main body 100 should be disassembled for cleaning the inner part thereof. Further, it may be difficult or impossible to fully clean the exhaust holes from the exterior of the main body 100 without potentially exposing internal circuitry and systems of the vacuum to water or other cleaning solutions.~~

[0070] Figs. 13 and 14 shows show a fourth embodiment of the present invention, to solve the aforementioned problem.

[0071] The fourth embodiment in accordance with the present invention ~~proposes a device for exhausting an exhaust system~~ in which a side portion of the main body 100 at ~~which the wheel is located~~ is completely ~~opened, open without exhaust holes.~~ and the ~~A~~ guiding projection 202, ~~projected toward the wheel and along whose~~ has an outer circumference that projects from the main body 100 and around an opening in the main body 100. A portion of the guiding projection supports the rolling member 163 is ~~mounted, is formed at the outer circumference of the opened portion.~~ Additionally, ~~a~~ A separate filter assembly 200 having an air exhaust filter 210 is mounted ~~at the outside of between the guiding projection 202 and the guiding member 230 to form the wheel.~~

[0072] ~~At this instance, the~~ The filter assembly 200 is securely fixed to the main body 100 of the vacuum cleaner ~~with stability, using a bolt 104 or the like.~~ In the illustrated embodiment, a bolt is used. However, securing devices may also be used.

[0073] ~~In the~~ The filter assembly 200, ~~the~~ includes center axis 220 which penetrates and supports the air exhaust filter 210 ~~is formed on a surface close to the main body 100, at the inner center thereof.~~ A guiding member 230 for supporting the air exhaust filter 210 is mounted at the center axis 220 to prevent detachment of the air exhaust filter 210. ~~At this instance,~~ When assembled, the guiding member 230 is ~~fixed to~~ moved against the filter assembly 200 using the grip portion 164 ~~same as the~~ in a manner as described with respect to the aforementioned embodiments, ~~and a rotation preventing portion~~ Rotation prevention portions 231 ~~is additionally formed at the inner circumference of the guiding member 30~~ are used for compressing the outer part of the air exhaust filter 210.

[0074] ~~Accordingly, the~~ The air exhaust filter 210 in the filter assembly 200 can be replaced without disassembling the filter assembly 200.

~~As a result, with the aforementioned structure of the fourth embodiment, it is possible to completely open the side portion of the main body 100 to which the air is exhausted. Thus, the fine dusts contained in the exhausted air do not contact the air exhaust filter, and cleaning thereof is not necessary.~~

~~Additionally, the filter assembly 200, with which the fine dust contact, can be detached from the main body 100 of the vacuum cleaner. Therefore, for cleaning of the contaminated area, the filter assembly 200 can simply be detached and cleaned. Thus,~~

~~various circuit substrates within the main body of the vacuum cleaner are safe from the problem such as the inflow of water thereto.~~

[0075] Meanwhile, while the device for exhausting exhaust system of the present invention is characterized in that the it is formed at either one of the two portions at which the main body 100 and the wheel 160 are connected, the present invention is not limited to this. as having a wheel construction with guiding projection and guiding member, other variations of the wheel and supporting structure are possible that do not depart from the spirit and scope of the invention.

[0076] That is, For example, a plurality of exhaust holes may be provided at each sides side of the main body and an air exhaust filter may be provided between the exhaust holes and the wheel, for efficient exhausting of air and collecting of the fine dusts contained in the exhausted air.

~~However, in the present invention, the device for exhausting is provided only at one side of the main body, so that the separate flow passage guide for guiding a direction of the air flow within the main body 100 can be formed with ease.~~

[0077] Accordingly, Further, while the preferred embodiments of the exhaust system use only one wheel located on one side of the main body as an exhaust passage, multiple wheels that define multiple exhaust passages may be used. a separate supplementary air exhaust filter (not shown) is provided between the wheel connected to the opposite to the device for exhausting and the side portion of the main body, for convenience of a user to replace the supplementary filter with a new one. In these variations, the exhaust passage may include one or multiple wheels with filters that may be used together or in various combinations. For example, in one system, the user may sequentially use multiple wheel passages one at a time. As the filters in each wheel become blocked with debris, the blocked wheel is deactivated and a new wheel opened. This enables the user to use the vacuum even if the initial filter becomes inoperable.

#### Industrial Applicability

~~As aforementioned, the device for exhausting in a vacuum cleaner in accordance with the present invention is not visible because it is hidden by the wheels, and the air flown within the main body is exhausted through the wheels. Accordingly, the rear of the~~



~~main body of the vacuum cleaner can be more practically used in view of the design of the vacuum cleaner.~~

~~Additionally, the air exhaust filter can be easily replaced by detaching only the wheels, thereby allowing easy operation of a user. At this instance, the wheels can be detached more easily in accordance with each embodiment of the present invention, improving satisfaction of a user.~~

~~Accordingly, the present invention is usefully applicable industrially.~~